

CLAIMS

1. A method of assessing an LSD (Lysosomal storage disorder) status of an individual the method comprising the steps of,
taking a tissue or body fluid sample from the individual,
5 estimating a level in the sample of each of three or more compound indicators, said indicators being indicative of the level of respectively each of three or more lipid containing storage associated compounds,
calculating an LSD index number using all of said compound indicators,
and comparing the LSD index number of the sample with a standard to provide an
10 assessment of the LSD status of the individual.
2. A method of assessing an LSD status of an individual the method comprising the steps of,
taking a tissue or body fluid sample from the individual,
15 estimating a level in the sample of each of two or more compound indicators being indicative of the level respectively of each of two or more lipid containing storage associated compounds,
calculating an LSD index number using all of said compound indicators,
and comparing the LSD index number of the sample with a standard to provide an
20 assessment of the LSD status of the individual,
the two or more storage associated compounds selected to discriminate between an LSD individual from a non-LSD individual with an acceptable confidence level.
3. A method for screening for the status of two or more LSDs in an individual,
25 taking a single tissue or body fluid sample from the individual,
estimating a level in the sample of each three or more compound indicators being indicative of the concentration respectively of each of three or more lipid containing storage associated compounds,
calculating a first LSD index number using a first set of two or more of said
30 compound indicators and comparing the first LSD index number of the sample with a first control indicator to provide an assessment of the LSD status of the first LSD,

and calculating a second LSD index number using a second set of two or more of said compound indicators and comparing the second LSD index number of the individual with a second standard to provide an assessment of the LSD status of the second LSD in the individual.

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4. The method as in any one of claims 1 to 3 wherein the storage associated compounds are selected from the group of compounds consisting of phospholipids and glycolipids.

10 5. The method of claim 4 wherein the glycolipids are selected from the group comprising glycerolipids, glycosphatidylinositols, glycosphingolipids.

6. The method of claim 4 wherein the storage associated compounds are phospholipids and are characterised by head groups selected from the group consisting of
15 phosphatidyl serine, phosphatidylinositol, phosphatidyl ethanolamine and sphingomyelin phosphatidyl glycerol, phosphatidyl serine, phosphatidyl inositol, phosphatidyl ethanolamine, cerebroside or a ganglioside.

7. The method of claim 6 wherein the phospholipids are further characterised by the
20 fatty acids which are selected from the group consisting of 1-palmitoyl-2-oleoyl-, 1-palmitoyl-2-linoleoyl -, 1-palmitoyl-2-arachadonyl -, 1-palmitoyl-2-docosahexanoyl.

8. The method of claim 4 wherein the indicator of the level of lipid containing storage associated compound is measured by a technique selected from the group
25 consisting of electrophoresis, chromatography, Gas chromatography, HPLC (High pressure Liquid Chromatography), Nuclear Magnetic resonance analysis, gas chromatography-mass spectrometry (GC-MS), GC linked to Fourier-transform infrared spectroscopy (FTIR), and silver ion and reversed-phase high-performance liquid chromatography (HPLC) and mass spectrometry.

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9. The method of claim 8 wherein the technique is mass spectrometry.

10. The method of claim 9 where the mass sepctrometry is electrospray ionisation-tandem mass spectrometry (ESI-MSMS).
11. The method as in claim 4 wherein at least two lipid containing storage associated
5 compounds are selected one from a first group that increases in LSD individual and a second from a second group that decreases in levels in LSD individual and the values for the first and second compounds are combined to give an index number.
12. The method as in claim 4 wherein the is whole blood or products derived
10 therefrom.
13. The method as in claim 4 wherein the samples are obtained from young patients selected from the group consisting of embryos, foetuses, neonatals, young infants.
- 15 14. The method of claim 4 used to determine subclinical levels of the LSD before onset of physical manifestations become apparent.
15. The method of claim 4 wherein the LSD is Gaucher disease.
- 20 16. The method of claim 3 to measure the severity of the LSD.
17. The method of either claim 1 or 3 wherein the LSD is Fabry and a first compound is selected from the group consisting of Cer (ceramide), LC (lactosyl ceramide), CTH (trihexosylceramide) and the second compound is selected from the group consisting of
25 SM (sphingomyelin) and GC (glucosylceramide).
18. The method of claim 17 wherein two or more of Cer, LC and CTH is compared to SM.
- 30 19. The method of claim 17 wherein two or more of Cer, LC and CTH is compared to GC.

20. The method of claim 17 wherein the Cer, LC and CTH are C24:1 species.
21. The method of claim 20 wherein CTH and LC (24:1) is compared to SM (C24:0).
- 5 22. The method of claim 17 wherein the index is calculated according to the following calculation $(LC\ C24:1 * CTH\ C24:1) / (GC\ C24:0 * SM\ C24:0)$.
23. The method of either claim 1 or 3 wherein the LSD is Gaucher and two compounds are selected from the group consisting of SM, LC CTH and the third
10 compound is selected from the group consisting of Cer and GC.
24. The method of claim 23 wherein two or more of SM, LC and CTH are compared to Cer.
- 15 25. The method of claim 23 wherein two or more of SM LC and CTH are compared with GC.
26. The method of claim 23 wherein two or more of SM LC and CTH are compared with Cer and GC.
- 20 27. A method of developing a diagnostic method comprising the steps of
taking a first group of LSD samples one each from a plurality of LSD individuals
affected by one type of LSD,
taking a second group of control samples one each from a plurality of control
25 individuals not affected by LSD
the sample being of a tissue or body fluid of the individual
an LSD group of individuals with LSD
interrogating the first group of samples by mass spectrometry for first levels of a
plurality of indicators of respective lipid containing storage associated compounds,
30 interrogating the second group of samples by mass spectrometry for second levels
of the plurality of indicators of respective lipid containing storage associated compounds,

- the lipid containing storage associated compounds selected from the class of compounds consisting of the group glycolipids and phospholipids,
comparing the first levels with the second levels
identifying a first group of lipid containing storage associated compound which are
5 shown as having increased levels of indicators in the first LSD group compared to the control group,
identifying a second group of lipid containing storage associated compounds which are shown as having decreased levels of indicators in the LSD group compared to the control group,
10 formulating a combination of two or more of the first and/or second group of indicators by which to calculate and index number whereby to distinguish LSD samples from control samples, and preferably
preparing a standard being a scale of index numbers reflective of the severity of the LSD.
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